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MACMILLAN, SOBANSKI & TODD, LLC
ONE MARITIME PLAZA - FIFTH FLOOR
720 WATER STREET
TOLEDO, OH 43604

EXAMINER	
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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

MAILED

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GROUP 3600

Application Number: 10/774,805
Filing Date: February 09, 2004
Appellant(s): JIANG ET AL.

Frank G. McKenzie of MacMillan, Sobanski & Todd, LLC
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 2/20/07 appealing from the Office action mailed 8/25/06.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is deficient. 37 CFR 41.37(c)(1)(v) requires the summary of claimed subject matter to include: (1) a concise explanation of the subject matter defined in each of the independent claims involved in the appeal, referring to the specification by page and line number, and to the drawing, if any, by reference characters and (2) for each independent claim involved in the appeal and for each dependent claim argued separately, every means plus function and step plus function as permitted by 35 U.S.C. 112, sixth paragraph, must be identified and the structure, material, or acts described in the specification as corresponding to each claimed function must be set forth with reference to the specification by page and line number, and to the drawing, if any, by reference characters.

The brief is deficient in its summary of the claimed subject matter because each of independent claims 1 and 17 (referred to in the first, ninth and tenth paragraphs under

said heading), is supplemented by references to subject matter of dependent claims, without being labeled as such. The first paragraph under the heading does accurately represent claim 1. The two paragraphs thereafter refer to the subject matter of claim 2, etc.

The second paragraph from the bottom of page 3, indicates that the claimed method of claim 1 includes "establishing a threshold clutch temperature that is higher than the reference clutch temperature", however the Examiner has not found a recitation of "threshold" in claim 1 and therefore this portion of the summary of claimed subject matter is in error.

Likewise, the last paragraph of page 3 of Appellant's brief seems to indicate that the subject mater of claim 17 includes a "clutch servo 262", "clutch pressure solenoid 256" and the "source of fluid pressure 258", where in fact there is no mention in independent claim 17 of any reference to any clutch servo, pressure solenoid or fluid pressure, but just a controller for performing the operating, calculating comparing and control (output) signal functions. Again, these additional recitations are from the subject matter of dependent claims.

(6) Grounds of Rejection to be Reviewed on Appeal

Appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct.

The changes are as follows: the grounds of rejection numbered 5 – 15 (wrt the rejection of claims 1-9 and 17-19 under 35 U.S.C. 103(a)), should instead read that the grounds of rejection is under 35 U.S.C. 103(a) as being obvious or

unpatentable over Salecker et al. (6,006,149) in view of Maguire et al. (6,095,946), as Appellant has properly indicated at the top of page 11 of the appeal brief.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,095,946	Maguire et al.	8-2000
6,006,149	Salecker et al.	12-1999

9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 17-19 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Maguire et al (6, 095,946).

Independent claim 1 recites a method for controlling a clutch that driveably connects an input and an output comprising the steps of producing input torque at the clutch,

operating the clutch partially engaged, calculating the temperature of the clutch, establishing a reference clutch temperature, comparing the calculated and the reference temperatures, and subsequently increasing the degree of clutch engagement to reduce the calculated temperature of the clutch.

As shown in figure 1, Maguire et al. discloses a temperature rise control method for a clutch (18), placed between an engine (12, which produces and input torque) and a differential (16), where the transmission (14) housing itself is considered to be the equivalent of Appellant's recited transfer case. Figure 4 of Maguire et al. discloses calculating the temperature of the clutch. Where col. 3, lines 12-21 particularly teaches that relative slippage between adjacent discs transmits energy to the clutch system which raises its temperature, and that the clutch disc structure(s) is cooled by fluid flow when "completely engaged" or disengaged (lines 12-16). It goes on to say that this slipping during the engagement cycle of the friction (clutch) device produces heat which is then transferred from the steel discs to the hydraulic fluid and surrounding metal components. This aspect of "calculating the temperature of the clutch" is depicted graphically in figure 4, along with a design (reference) temperature limit (26), as well as also disclosing the control of the degree of clutch engagement sufficient to reduce the temperature of the clutch (30) below the reference limit (26).

With respect to claims 17-19, where claim 17 further recites "means for producing an output signal" for increasing the degree of clutch engagement sufficiently to reduce the calculated temperature of the clutch, please see previously noted section of col. 3, ll. 12-21, as well as lines 43-62 of col. 3 which disclose the use of an electro-hydraulic control unit (22) for controlling solenoid valves along with the engagement and disengagement of

friction mechanisms of the clutch (18) by further controlling the engagement time, rate of pressure change in the friction device engagement "and the maximum engagement pressure in the friction devices". This aspect is further reinforced by the section including lines 35-44 wherein Maguire et al., teaches that if it is determined that the calculated clutch temperature may exceed the clutch reference/limit temperature then "[t]he shift will generally be made with lower engine torque and increased apply pressure at the friction device".

With respect to dependent claims 18 and 19, which recite fully engaging the clutch and the use of a servo and solenoid for engaging and disengaging the clutch, please see the lower portion of column 3, lines 43-62, noted above as relating to solenoid engagement of the clutch friction mechanisms.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-9 and 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Salecker et al. (USPN 6,006,149) in view of Maguire et al. (USPN 6,095,946).

With respect to independent claims 1 and 17, Salecker et al. discloses an actuating apparatus for a torque transmitting system (clutch), in which the temperature thereof is

calculated or determined using an iterative process in which the temperature of the clutch is determined as a function of time from one instant *t*, to the next instant $t + \Delta t$ (col. 2, ll. 34-40). Column 5 line 63 through col. 6, l. 11 of Salecker et al. discloses that the torque transmitting system (103) comprises an input side (107) and an output side (108), and that if there exists a difference in the RPM (speed) between the input side and the output side then there develops an energy input which is converted into friction heat, entailing a temperature rise. Additionally, col. 9, ll. 25-35 disclose preventing excessive slip in a torque transmitting system by means of control unit (113) which can ascertain, calculate and/or determine whether or not increased (excessive) slip exists and then proceeds to initiate or carry out undertakings which are to prevent an excessive stressing and/or destruction of the torque transmitting system (clutch). While Salecker et al. does teach preventing excessive stressing or destruction of the torque transmitting system, it does not particularly teach "increasing the degree of clutch engagement sufficiently to reduce the calculated temperature of the clutch" when a calculated clutch temperature equals or exceeds the reference clutch temperature.

Maguire et al. teaches a method of temperature rise control for a disc type friction torque transmitting system in which column 3, ll. 12-21 particularly teach completely engaging or completely disengaging the clutch discs to avoid additional heating of the clutch system, where col. 4, ll. 23-29 further disclose that this transmission control is accomplished by keeping track of the temperature increase and mitigating any additional heating when the clutch temperature reaches or exceeds the desired clutch temperature limit as shown in figure 4.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have implemented the clutch temperature threshold limit control as taught by Maguire et al., within the context of the clutch temperature monitoring system of Salecker et al., because both are directed to monitoring clutch temperature as it relates to transmission of torque through a slipping clutch arrangement, in which both Maguire et al. and Salecker et al. act to prevent excessive heat related stressing of the torque transmitting system by limiting or eliminating clutch slip when temperatures warrant so as to preserve the safe operation of the clutch at a reduced temperature.

With respect to claims 2 and 3, which relate to determining current clutch slip and determining first and second clutch torque magnitudes, please see col. 8, ll. 49-67 and col. 9, ll. 25-35 of Salecker et al., which teaches clutch slip adjustment for torque transmission while limiting excessive clutch slip, and wherein it would have been obvious to one of ordinary skill in the art of clutch control that clutch slip is eliminated when the clutch is fully engaged.

With respect to claim 4, which relates to repetitively calculating the temperature of the clutch and maintaining a running total of the change of clutch temperature over each interval, please see Figure 4 of Maguire et al., as well as col. 2, ll. 34-40 and column 3 of Salecker et al.

With respect to claim 5, which relates to repetitively calculating the clutch temperature as well as calculating a differential change in transmitted power over the successive intervals, determining the thermal mass of the clutch, etc., please see col. 3, ll. 9-44, wherein Salecker et al. discloses the temperature increase attendant greater clutch

clip and torque transfer as it relates to the heat or thermal/heat capacity/mass of the clutch components.

With respect to claim 6, which relates to repetitively determining the magnitude of power transmitted to the clutch input and the magnitude of power transmitted from the clutch output, over successive intervals, please see figures 2 and 3 of Maguire et al.

With respect to claims 7 and 8, which relate to determining clutch gain, repetitively determining the magnitude of the clutch pressure at successive intervals, determining the average coefficient of friction for friction disc-spacer sets, determining the number of pairs of sets, determining the effective friction area, etc., please see figure 2 (and in particular #46) of Maguire et al., as well as col. 1, ll. 14-33 and col. 3.

With respect to claim 9, which relates to fully engaging the clutch if the clutch threshold temperature greater than the reference temp of claim 1, it would have been obvious to one of ordinary skill in the art at the time the invention was made to fully engage the clutch if it had been, or once it has been determined that, the clutch temperature is higher than a reference or limit value, in order to bring down the clutch temperature by eliminating the relative slip between the clutch surfaces.

With respect to claims 18 and 19, and an output signal for full engagement of the clutch, as well as the use of a fluid pressure source, servo and solenoid being used in response to the output signal for increasing the magnitude of pressure in the servo and applied to the clutch, please see column 2, lines 52-54 with respect to a conventional planetary gearbox (20) and an electro-hydraulic control (22) of Maguire et al., and in particular col. 3, ll. 54-62 of Maguire et al which particularly teach and disclose that the electro-hydraulic control unit (CPU) controls various devices such as solenoid valves,

engine spark, etc., and that some of the solenoid valves control the engagement and disengagement of the friction mechanisms including the clutch (18), including "*the maximum engagement pressure in the friction devices*".

(10) Response to Argument

Appellant's claim 1 recites a method of controlling a clutch in a partially engaged state such that the degree of engagement is sufficiently increased in order to keep the calculated temperature of a clutch below an established reference limit. Figure 4 of Maguire et al. shows a temperature limit line (26), below which the invention of Maguire et al. operates to keep the calculated or detected temperature of the clutch (18 of fig. 1), below the predetermined limit temperature. Column 3, lines 12-12 of Maguire et al. clearly teach that it is known in the art that "the friction devices will transmit energy which will result in the friction discs increasing in temperature during engagement (relative slippage between adjacent discs) and the structures are cooled by fluid flow *when completely engaged or disengaged*". By the above Maguire et al. teaches both operating a clutch in a partially engaged state (at least part of the time), and that it is also known that the clutch temperature can be lowered (structures are cooled by fluid flow), by completely engaging the clutch (*or* completely disengaging the clutch). Yes, these teachings of Maguire et al. almost seem to be in passing, when one reads the rest of this reference with respect to shift time and engine load management used to *also* limit overheating of the clutch, based on the same principles of limiting the amount of slip imparted to the clutch components. Furthermore, in col. 3, ll. 57-62, Maguire et al. additionally teaches controlling the engagement time of the frictional devices, as well as the rate of pressure change in the

friction devices during engagement and the maximum engagement pressure (over and above the previous teaching of simply having the clutch either completely engaged or disengaged for cooling effect) .

Otherwise, Appellant's remarks and arguments center for the most part on attacking the examiner's exact citations of passages of the '946 patent of Maguire et al., with respect to certain claimed portions of subject matter, and then again using these same perceived shortcomings of Maguire et al. to discredit the rejection of claims 1-9 and 17-19, under 35 U.S.C. 103, as not being anticipated by Maguire et al., or being obvious in view of Salecker et al., and Maguire et al.

In this respect Applicant cites the section of Maguire et al. ('946), noted by the Examiner as column. 3, lines 12-21, and then suggests that "[t]he cited text is entirely silent with respect to changing the degree of clutch engagement". The fact of the matter is that Applicant seemed to choose to disregard the fact the this exact portion of the '946 reference explicitly teaches that relative slippage of the clutch discs causes an increase in clutch temperature during engagement, and that in response thereto the structures (e.g., the clutch discs) are cooled by fluid flow *when completely engaged or disengaged* (indicating a changed degree of clutch engagement from the partially engaged/slipping mode of engagement).

Applicant then suggests that column 4, lines 3-29 of Maguire et al. ('946) is also "entirely silent with respect to changing the degree of clutch engagement". While that may be true, the above cited portion of column 4 certainly teaches the use of a temperature calculating algorithm for use with the clutch friction device so as to keep the expected rise in temperature below design limits (col. 4, ll. 30-35), where lines 43-44 particularly and

specifically teach or disclose increasing the pressure applied to the friction device (clutch). Likewise, the lower portion of col. 3 (ll. 44-62) disclose the electro-hydraulic controller (22) and use of solenoid valves for engagement and disengagement of the friction mechanisms including the clutch (18), as well as the fact that the CPU controls not only the engine output but also the engagement time of the friction devices, the rate of pressure change in the friction devices during engagement and the *maximum engagement pressure* in the friction devices.

With respect to the rejection under 35 U.S.C. 103 as being unpatentable over Salecker et al. ('149) in view of Maguire et al. ('946), Applicant merely relies on the previous arguments with respect to Maguire et al., noted above, and suggests that once again the '946 patent is silent with respect to increasing the degree of clutch engagement to avoid an overheated clutch. This sustained argument with respect to Maguire et al., has been addressed at length above with respect to columns 3 and 4 thereof, and the combination with Salecker et al. for all of the pending claims 1-9 and 17-19 is primarily for the purpose of putting Maguire et al. into the context of an environment where a transfer case can be more readily visible as part of the vehicle drive train, and in particular because Salecker et al. also teaches the considerations required of a system for controlling the temperature rise in a friction clutch which is run in a partially engaged state.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Edward Pipala

Ed Pipala 6/19/07

JACK KEITH
SUPERVISORY PATENT EXAMINER

Conferees:

Jack Keith JK

Meredith Petravick MP